

QUARTERLY REPORT

FOR APRIL THROUGH JUNE 1993

OPERABLE UNIT 2
IM/IRA SURFACE WATER
FIELD TREATABILITY UNIT

PREPARED BY

 **EG&G ROCKY FLATS**
ENVIRONMENTAL RESTORATION
FACILITIES OPERATIONS MANAGEMENT

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Quarterly Operations Report for April Through June of 1993

at

Operable Unit No. 2 IM/IRA Field Treatability Unit

1.0 INTRODUCTION

This report covers operations of the Field Treatability Unit (FTU) for the second quarter of 1993. It is the third Quarterly Report to be prepared for this facility.

The FTU is being operated as an Interim Measure/Interim Remedial Action (IM/IRA) under the Plan released by the Department of Energy (DOE) on May 8, 1991. The FTU began operation as Phase I for treatment of surface water from a portion of the South Walnut Creek drainage at OU-2 for removal of volatile organic compounds (VOCs) of concern. The Phase I system consisted of collection facilities at Surface Water locations SW-59 and SW-61, equalization tankage, bag pre-filters, granular activated carbon (GAC) treatment units and insulated, heat traced transfer piping, pumps, and controls. Phase I was conducted between May 13, 1991 and April 27, 1992 at which time the Radionuclides Removal System (RRS) was implemented under the Phase II program. The RRS added provisions for treatment of radionuclides and metals by pH adjustment, chemical precipitation and cross-flow membrane filtration. The RRS replaced bag pre-filters as pretreatment to the GAC system. Detailed descriptions of the FTU and its operation can be found in the IM/IRAP, the Field Sampling Plan (FSP), and related documentation. The Field Treatability Study, Phase II (draft) for the South Walnut Creek Basin Surface Water Interim Measure/Interim Remedial Action report contains a detailed operating history of the FTU prior to this reporting period.

2.0 TREATMENT FACILITY PERFORMANCE

2.1 QUANTITY OF WATER TREATED

The FTU collects surface water from three weirs, SW 59, 61, and 132 twenty four hours per day, 375 days per year. Collected water is stored in a ten thousand gallon double walled polypropylene equalization tank until enough water is present to justify initiating a batch treatment. During April and May of this quarter, it was not uncommon for high precipitation events to force the FTU to treat water twenty four hours per day. The FTUs goal is to collect all water from the three weirs, up to 60 gallons per minute total, and treat the water to remove all contaminants below Applicable or Relevant and Appropriate Requirements (ARAR) limits.

The following illustrates the volume of water treated during this reporting period.

<u>Location</u>	<u>Month Total</u>	<u>Daily Average</u>	<u>Gallons per Min.</u>
April Weir 59	93,120 gal	3,104 gal	2.15
Weir 61	1,306,871 gal	43,562 gal	30.25
Discharge	1,400,000 gal	46,667 gal	32.40
May Weir 59	22,850 gal	263 gal	0.51
Weir 61	828,535 gal	27,464 gal	18.56
Discharge	851,385 gal	27,727 gal	19.07
June Weir 59	16,482 gal	550 gal	0.38
Weir 61	796,508 gal	26,550 gal	18.4
Discharge	812,990 gal	27,100 gal	18.8

The weirs operated at capacity and during several precipitation events operated up to 24 hours per day at full capacity to keep up with the incoming flows. During these high precipitation events, it is not uncommon for the flows to exceed the 60 gallon per minute collection rate. All water in excess of 60 gallon per minute is allowed to overflow the weirs.

2.2 CHEMICAL USAGE

Please refer to section 4.0, Operations Summary, to note the decrease in chemical usage by operations changes. Chemical usage for operations of the FTU were as follows:

<u>Month</u>	<u>Sulfuric Acid</u>	<u>Calcium Hydroxide</u>	<u>Ferric Sulfate</u>	<u>Powdered Carbon</u>	<u>Peroxide(H₂O₂)</u>
April	342 gallons	3,900 lbs	570 lbs	300 lb	60 gallons
May	246 gallons	2,750 lbs	495 lbs	50 lbs	40 gallons
June	174 gallons	2,023 lbs	339 lbs	35 lbs	30 gallons

2.3 WASTE GENERATION

Increased surface water flow to the FTU during this quarter resulted in an increase in waste generation. Sludge generation was as follows: April, 31 drums (@ 600 lbs each equals 18,600 lbs of sludge); May, 16 drums (9,600 lbs of sludge); and June, 19 drums (11,400 lbs sludge). All of the sludge generated at the OU-2 FTU is handled and packaged as low-level radioactive mixed waste.

Approximately two 55-gallon bags of personnel protective equipment (PPE) is generated per month, with six bags generated during the quarter. The PPE is monitored for contaminants, and then sent to the Rocky Flats Plant Landfill for disposal.

2.4 OPERATING COSTS

Operations and maintenance (O&M) of the FTU is performed by Resource Technology Group, Inc. (RTG), a subcontractor under the Master Task Subcontract (MTS) system. By utilizing subcontract labor, EG&G is able to operate the FTU at a significantly lower cost, while still providing qualified personnel. Average burdened labor costs for EG&G operators is approximately \$95/hour, whereas subcontract labor for O&M averages \$38/hour. MTS subcontractors bring many years operating experience on similar systems with them, and must complete the same training as EG&G personnel. The EG&G project manager oversees all of the FTUs operations, and provides input into the operations of the unit.

Monthly operating costs for operating the FTU are as follows:

	<u>April</u>	<u>May</u>	<u>June</u>
Subcontract labor	\$56,872	\$64,197	\$64,945
Chemicals/Supplies	\$ 3,271	\$ 4,763	\$ 5,321

2.5 POWER

Power for the FTU is provided by a portable 250-kW diesel generator. The EG&G garage took responsibility for the operations, maintenance, and fueling of the generator on April 15, 1993. The generator experienced one shutdown (see section 2.7, Periods of Non-Collection) from mechanical troubles during the quarter.

During this quarter, the generator consumed approximately 15,000 gallons of diesel fuel.

FOM is still pursuing installation of permanent plant power to the FTU.

2.6 PREVENTIVE MAINTENANCE

During the second half of this reporting period a rigorous preventative maintenance program was implemented. All process equipment at the FTU is being characterized and evaluated for preventative maintenance frequency, spare parts requirements, and impacts on the system from individual equipment failure.

An IBM computer has been purchased for use by FOM facilities. This computer will be used for entering Rocky Flats Environmental Data System (RFEDS) sampling data into the RFEDS system, inventory control, and for running a preventative maintenance program designed to provide scheduled the required preventative maintenance to all FOM operated equipment. The

entire OU-2 FTU facility will be entered into this program to assure that proper and timely preventative maintenance takes place.

2.7 PERIODS OF NON-COLLECTION

Periods of non-collection are periods when for some reason (usually power loss) the collection weir pumps cannot collect all collected surface water (up to 60 gallons per minute) and transfer it to the equalization tank for storage and later treatment. Shutdown of the generator, which provides power to the FTU, occurs for a period of ten to fifteen minutes each day to allow for fuel, oil, and preventative maintenance.

Once per week the generator is shut down for approximately 30 minutes while the oil is changed.

On May 24, the generator experienced problems and was shut down for one hour. The next day, May 25, the generator was taken out-of-service and replaced with a backup generator. The FTU was shut down for two hours while the generator transfer took place.

On June 18, the membranes had become clogged and required a chemical cleaning. During this cleaning, the FTU did not collect water from the weirs for a total of 45 minutes.

On June 21, the generator was returned from the garage and placed back into service. The FTU was shut down for one and a half hours while the generator transfer took place.

3.0 SAMPLING

3.1 SAMPLING OBJECTIVES

Characterization of the water from the three weirs (SW 59, 61, and 132) indicates the presence of radionuclides, heavy metals, volatile organic compounds (VOCs), and suspended solids to which contamination may be absorbed. The Interim Remedial Action Plan (IRAP) identified specific analytes of concern and established possible chemical-specific ARARs as effluent standards for discharge of the treated water. Influent concentrations (estimated from a flow-weighted maximum concentration model, and prepared to establish a basis for conceptual design for the surface water treatment system) and associated ARARs are presented in Table 1 located in appendix A.

Sampling at the FTU is performed to characterize the influent surface water, wastes, and effluent water, as well as to initiate optimization of FTU operations to minimize chemical consumption and waste generation.

During this sampling quarter, 103 environmental samples were taken and shipped to EPA approved offsite analytical laboratories. The OU-2 Treatability Study Report provides an

excellent summary of sample analytical results for samples taken just prior to this sampling quarter. Validated data for this sampling period will be presented in the next quarterly report, as there is a several month delay between sampling events and receiving validated data results from the labs. Unvalidated sample results can be obtained from the EG&G Project Manager, or from the Rocky Flats Environmental Data System (RFEDS) group.

Preliminary sample results showing contaminants exceeding ARARs will be presented below, as well as contaminants not associated with ARARs that are present in the water stream and are elevated above detection levels.

3.2 RS-1 (UNTREATED INFLUENT WATER FROM WEIRS)

<u>Chemical</u>	<u>Detects</u>	<u>Detects</u> <u>>ARAR</u>	<u>Units</u>	<u>High Value</u>	<u>Average¹</u>	<u>ARAR</u>
VOCs						
1,1-Dichloroethene	1	-	ug/l	3	0.64	-
1,1,1-Trichloroethane	5	-	ug/l	8.5	3.66	-
Carbon Tetrachloride	5	2	ug/l	81.5	23.7	5.00
Chloroform	5	2	ug/l	12	3.70	1.00
Methylene Chloride	1	-	ug/l	0.3	0.1	-
Tetrachloroethene	5	5	ug/l	52	16.6	1.00
Trichloroethene	5	2	ug/l	50.5	16.5	5.00
cis-1,2-Dichloroethene	5	-	ug/l	38.5	17.1	-
Metals						
Aluminum	5	3	ug/l	1730	679	200
Iron	5	2	ug/l	2290	912	1000
Zinc	5	5	ug/l	175	150	50.0

Radionuclides

No radionuclide data had been received prior to preparation of this report.

¹ Average value calculated by taking all values (for non-detect, 1/2 the detection limit was used) and dividing the value by the number of samples.

- No ARARs exist for this chemical at the FTU

3.3 RS-5 (TREATED EFFLUENT FROM CHEMICAL PRECIPITATION/MICROFILTRATION (PRIOR TO GAC))

<u>Chemical</u>	<u>Detects</u>	<u>Detects</u> <u>>ARAR</u>	<u>Units</u>	<u>High Value</u>	<u>Average¹</u>	<u>ARAR</u>
VOCs						
1,1,1-Trichloroethane	3	-	ug/l	0.6	0.30	-
1,1,2-Trichloroethane	1	-	ug/l	0.6	0.36	-
Carbon Tetrachloride	3	0	ug/l	0.6	0.31	5.00
Chloroform	3	0	ug/l	0.45	0.21	1.00
Methylene Chloride	1	-	ug/l	0.2	0.08	-
Tetrachloroethene	2	0	ug/l	0.9	0.35	1.00
Trichloroethene	1	0	ug/l	0.85	0.21	5.00
cis-1,2-Dichloroethene	4	-	ug/l	3.5	1.05	-

Metals

No metals exceeded ARARs at this sampling location.

Radionuclides

No radionuclide data had been recieved prior to preparation of this report.

¹ Average value calculated by taking all values (for non-detect, 1/2 the detection limit was used) and dividing the value by the number of samples.

- No ARARs exist for this chemical at the FTU

3.4 RS-6 (LEAD GAC EFFLUENT)

Review of the recieved sample data for this quarter indicates that no ARARs were exceeded at this sample point. Radionuclide data has not been recieved.

3.5 RS-7 (TREATED EFFLUENT)

The only constituent that exceeded ARAR values is iron, which had a value of 1110.00 ug/l and an ARAR of 1000.00 ug/l. This only occurred on one sampling event, and this result has not yet been validated. Radionuclide data has not been recieved for this sample location.

3.6 RS-8 (SLUDGE)

Preliminary data indicates that all VOC samples for the sludge taken during this sample period contain no VOCs.

Preliminary data has been returned for two radionuclide samples. In both cases, Gross Alpha and Plutonium-239/240 exceeded ARAR values, with averages of 16.56 ± 4.42 pCi/g and 0.0634 ± 0.0292 pCi/g. ARARs for Gross Alpha is 11.0 pCi/g, and Plutonium-239/240 is 0.05.

4.0 OPERATIONS SUMMARY

Operations of the FTU was taken over by a new subcontractor on May 1, 1993. Reidel Environmental Services, Inc., provided two months of on-the-job training (March and April) to the new subcontractor, Resource Technology Group, Inc. (RTG). Reidel Environmental Services had operated the FTU throughout the startup of both Phase I and Phase II operations. RTG initially designed and supplied the Phase II chemical precipitation/microfiltration units, and has operated several similar systems at other DOE facilities.

The use of powdered activated carbon has been greatly reduced/eliminated. In the past powdered carbon was added to the concentration tank to aid in scouring of the membranes. Powdered Carbon is only added now if the membranes need scoured immediately, without waiting for the percent solids to raise naturally. By monitoring the percent solids in the concentration tank, successful scouring of the membrane has been achieved without the addition of powdered carbon. Since the powdered carbon was added prior to the microfiltration process, it was removed from the water stream and treated as low-level mixed waste. On average fifty (50) pounds of carbon was added per week to the system. This amounts to 2,600 pounds of additional waste that will not be generated this year alone. At 650 lbs per drum, this amounts to four (4) less low-level mixed waste drums generated per year. Reduced operations costs also occurred, as less chemicals used equals less cost to operate.

During a chemical cleaning of the microfiltration membranes, twenty (20) gallons of 93% sulfuric acid and ten (10) gallons of 10% hydrogen peroxide are added to 250 gallons of make-up water to chemically remove deposits from the membranes. In the past both the sulfuric and hydrogen peroxide were considered spent and not used again after a cleaning cycle. The new subcontractor identified that the spent solution was still acidic enough for further uses. Recycling of the cleaning water has resulted in approximately eighteen (18) gallons less sulfuric acid used during each cleaning cycle. The pH of the solution is checked prior to each use to verify proper acidity is present to perform a chemical cleaning.

5.0 ENVIRONMENTAL COMPLIANCE

No spills or releases of hazardous material took place at the FTU during this quarter.

6.0 REPORTS/CORRESPONDENCE

During this reporting period, the following reports/documents that pertained to the OU-2 FTU

were generated:

- SUMMARY AND ANALYSIS OF RESULTS , FIELD TREATABILITY STUDY, PHASE II, for the South Walnut Creek Basin Surface Water Interim Measure/Interim Remedial Action (Operable Unit No. 2)-Preliminary Draft. May, 1993.
- Letter from R. L. Benedetti (EG&G) to J. K. Hartman (DOE,RFO) dated May 26, 1993 entitled "OPERABLE UNIT 2 (OU-2) SURFACE WATER INTERIM MEASURE/INTERIM REMEDIAL ACTION (IM/IRA) SHUTDOWN NOTIFICATIONS -RLB-252-93", correspondence control outgoing letter number 93-RF-6547.
- Letter from R. L. Benedetti (EG&G) to J. K. Hartman (DOE,RFO) dated June 29, 1993 entitled "OPERABLE UNIT 2 (OU-2) SURFACE WATER INTERIM MEASURE/INTERIM REMEDIAL ACTION (IM/IRA) SHUTDOWNS AND DEVIATION FROM SAMPLING REQUIREMENTS -RLB-290-93", correspondence control outgoing letter number 93-RF-7380.

7.0 ANTICIPATED OPERATIONS FOR NEXT QUARTER

Normal operations are expected to continue next quarter. No shutdowns (other than routine generator servicing) are expected at the treatment facility. Replacement of the flow totalizer at weir 59 (currently out-of-commission) is scheduled to occur next quarter. The modification to eliminate the use of powdered activated carbon in tank Tk-8 will result in less generated waste (sludge) and lower chemical costs. Lower flows during the next quarter (historical) will allow for a rigorous preventive maintenance program to be implemented. Process improvements will continue to be recognized and implemented if deemed appropriate.

Methods for reducing the volume of sludge will continue to be explored. EG&G and the O&M subcontractor RTG will continue to explore reducing the volume of sludge generated per volume of water treated. FOM feels that by continuing to fine-tune the facility, waste generation can be minimized. Since disposal of mixed waste is very difficult and expensive, FOM will attempt to reduce the volume of sludge produced per volume of water treated by at least ten percent during the next quarter.

Installation of permanent plant power to the FTU is still in progress. Installation could take place during the next quarter.

A request will be sent to the regulatory agencies to request a decrease in the sampling frequency at the FTU. The Treatability Study Report, Phase II, will be completed by July 13, 1993, so additional data for it will not be required. The Interim Measure/Interim Remedial Action Plan for the FTU requires only two (2) effluent samples per week. By reducing the current sampling and analysis plan (SAP) to the required samples (plus some additional for carbon breakthrough analysis and additional system performance monitoring), it is hoped to significantly reduce the costs associated with the current SAP (estimated at \$1,000,000 for

fiscal year 1994).

The Treatability Study Report for Phase II (due July 13, 1993) will recommend discontinuing collection of water from the three weirs (SW-59, 61, and 132) due to the low levels of contamination. If the regulatory agencies concur with this proposal, the facility would be prepared/modified for use at other sites, or remain at its present location and used to treat water from other sources. If discontinuing of collection/treatment is not granted, modifications will be made to the facility to enable it to collect water during the night shift, even though the shift would be unmanned. This would eliminate a significant amount of operator hours, thus reducing the cost of operations significantly.

Water collected from the OU-2 Vapor Extraction Unit (startup September 15, 1993) will be treated at the OU-2 FTU. The water will be sampled to assure that it is compatible with the FTUs treatment capabilities. At this time estimates range from zero to twenty-thousand gallons of collected water during the first month.

Purge water collected from contaminated wells may be treated at the FTU. All purge water would be sampled to determine the best facility to treat the water. Possibilities for treatment include the OU-1 IM/IRA (Bldg. 891), OU-2 IM/IRA FTU, 374 Evaporator, and the Sewage Treatment Plant. Each facility is limited by certain contaminants, so sampling would determine the final destination.

8.0 SUMMARY/CONCLUSIONS

The Ou-2 FTU continues to collect and treat contaminated surface water from the South Walnut Creek Basin 24-hours per day, 375-days per year. Process improvements have reduced both operating costs and generated hazardous waste, and these efforts will continue. Waste reduction, chemical use minimization, and treatment facility optimization will also continue to be explored/implemented in order to make the FTU a more efficient operable unit. Possible other uses for the FTU will be explored in order to make it more useful to the environmental remediation efforts being undertaken at the Rocky Flats Plant.

Appendix A

TABLE 1
Surface Water Contaminants
Identified in the South Walnut Creek Basin IM/IRAP^{1,2}

<u>Analyte</u>	<u>Unit</u>	<u>Average Concentration</u>	<u>ARAR</u>
Radionuclides			
Am-241	pCi/l	0.53	0.05
Gross alpha	pCi/l	730.00	11.00
Gross beta	pCi/l	545.00	19.00
PU-239/240	pCi/l	3.28	0.05
U-total	pCi/l	11.69	10.00
VOCs³			
1,1-Dichloroethene	µg/l	142	7.00
Carbon Tetrachloride	µg/l	219	5.00
Chloroform	µg/l	82	1.00
Tetrachloroethene	µg/l	279	1.00
Trichloroethene	µg/l	153	5.00
Vinyl Chloride	µg/l	-	2.00
Metals-Dissolved			
Iron	µg/l	-	300.00
Manganese	µg/l	0.5790	50.00
Metals-Total			
Aluminum	µg/l	25.1214	200.00
Arsenic	µg/l	-	50.00
Barium	µg/l	1.8530	1,000.
Beryllium	µg/l	0.0519	100.00
Cadmium	µg/l	0.0132	5.00
Chromium	µg/l	0.1918	10.00
Copper	µg/l	0.2664	25.00
Iron	µg/l	183.964	1,000.
Lead	µg/l	0.1954	5.00
Manganese	µg/l	3.3068	1,000.
Mercury	µg/l	0.0022	0.20
Nickel	µg/l	0.2239	40.00
Selenium	µg/l	0.0070	10.00
<u>Zinc</u>	<u>µg/l</u>	1.3475	50.00

¹ From the IM/IRAP (DOE, 1991).

² Only analytes with ARARs are presented.

³ Analyzed by EPA Method 524.2.

- Not calculated in the IM/IRAP.